sierra research
1801 J Street
Sacramento, CA 95814
(916) 444-6666
Fax: (916) 444-8373

April 28, 2005

Mike McCorison
U.S.F.S. Southern California
Angeles National Forest
701 North Santa Anita Avenue
Arcadia, CA 91006

Subject: Inland Empire Energy Center Revised Class I Air Quality Impacts Analysis Responses to Comments

Dear Mr. McCorison:

On March 4, 2005, Inland Empire Energy Center (IEEC) submitted a revised Class I Air Quality Impacts Analysis that reflected equipment changes proposed for this previously-reviewed project. The equipment changes result in no significant increases to maximum monthly or annual emissions as compared with the project that was previously reviewed and approved by the Federal Land Managers (FLMs).

On April 1, 2005, IEEC received informal comments from the FLMs regarding the revised Class I impacts analysis. IEEC responded to those comments on April 11, 2005. Based on our review of the FLM's comments, it appears that many elements of the original (2002) Class I analysis for IEEC were no longer acceptable to the FLMs, notwithstanding the relatively minor changes in emission rates associated with the proposed equipment changes.

On April 25, 2005, IEEC received additional, informal comments from the FLMs. Detailed responses to these comments are included in Attachment A to this letter.

In summary, the revised Class I impacts analysis indicates levels above USFS and NPS significance levels for various criteria, based on the FLM's revised recommended modeling approach. However, in large part, these levels are driven by conservative assumptions regarding the plant's operation, including intermittent emissions associated with turbine startup and operation of the auxiliary boiler and standby generators. Inasmuch as the proposed plant is a highly-efficient, well-controlled, gas-fired combined cycle power plant, we do not believe it would be appropriate to pursue more refined modeling analyses. Instead, we propose to mitigate the project's potential impacts on Class I areas through three mechanisms.

First, and as required by the South Coast AQMD, the project's emissions of oxides of nitrogen (NOx), sulfur oxides (SOx), and PM_{10} will be minimized through the use of best available control technology which, in the context of SCAQMD regulations, is at least as stringent as federal Lowest Achievable Emission Rate requirements.

Second, and also as required by the South Coast AQMD, the project's emissions of oxides of nitrogen (NOx), sulfur oxides (SOx), and PM_{10} will be fully offset through the provision of emission reduction credits (for SOx and PM_{10}), and RECLAIM trading credits (for NOx).[1] We believe that this will result in complete mitigation for the project's impacts in downwind Class I areas.

Third, and based upon the results of the screening modeling analyses, IEEC is proposing to provide further mitigation for these impacts by participating in the funding of a special visibility study in cooperation with the Forest Service. The primary purpose of the visibility study will be to establish a visibility baseline in the San Gorgonio Wilderness Area, which is near the Cucamonga Wilderness Area in the San Bernardino National Forest. During this period, it is our understanding that the Forest Service will request operating data from the SCAQMD for all of the gas turbines in the South Coast Air Basin. When the visibility study is completed, the impact of new industrial projects in southern California will be measured relative to this baseline to help determine if the projects will cause a significant degradation in visibility. It is also our understanding that IEEC's financial commitment to this effort will be approximately $15,000 per year for a period of three years, with the possibility of two additional years of support at the same rate. IEEC anticipates that this commitment will be memorialized in a Memorandum of Understanding between IEEC and the U.S. Forest Service within 6 months of permit issuance.

While we believe that the modeling results enclosed with this letter do not cause concern about a possible direct link between the emissions from IEEC and visibility degradation occurring in the nearby Class I Areas, we understand that the US Forest Service has expressed some concern regarding 1) the general ability of the models to adequately address the issue of multiple start-ups, and 2) how the cumulative effects of intermittent start-ups over a wide area might affect daily and seasonal visibility patterns. For example, the VISCREEN runs prepared for IEEC suggest that on days when both gas turbines experience a cold startup, visibility impacts might be experienced at the Agua Tibia, San Jacinto, and San Gorgonio Wilderness Areas if adverse meteorological conditions are coincident with those operations. However, when the plant is operated as expected, at baseload conditions, no adverse impacts are expected under any meteorological conditions. The proposed visibility study will help to evaluate whether infrequent, intermittent, high emitting activities from clean, efficient, gas-fired power plants have the potential to materially affect visibility in Southern California Class I areas.

Monitoring can also determine whether predicted resource conditions are accurately represented and allows for the examination of the effectiveness of other mitigation measures at reducing environmental impacts. Providing for baseline and/or post-construction monitoring has been identified as an appropriate mitigation technique, as outlined in the Federal Land Managers Air Quality Related Values Workgroup Phase I Report (FLAG, December 2000). Further mitigation techniques as outlined in FLAG,

---

[1] The only exception to this relates to the SOx and PM_{10} emissions from the standby generators, emergency fire pump, and cooling tower. However, given the intermittent and infrequent operation of the standby generators and emergency fire pump, and the relatively cool plume from the cooling tower, no significant impacts from these sources on the distant Class I areas are anticipated. Nonetheless, the impacts of these units were included in the Class I area impact analyses.

and already required for this project, include the use of emission control technologies representing the Lowest Achievable Emission Rate (LAER) and, as described above, the surrender of emission reduction credits.[2] The federal Clean Air Act gave FLMs an "affirmative responsibility" to protect the Air Quality Related Values (AQRVs) of Class I areas from adverse impacts. The proposed visibility study will allow the FLMs to assess current and future visibility impairment, thus, helping to ensure that existing and future mitigation measures will be effective at protecting the resources within each Class I area.

As discussed above, the proposed mitigation for participation in the visibility study is based partly on the assumption(s) used in modeling the worst-case regional visibility impacts. For example, to assess the potential for regional haze impacts on a daily (24-hour) basis, it was assumed that both turbines would experience a six-hour cold startup each day of the year for a total of 365 startup/shutdowns and 2190 hours of high-emission operation. This assumption is extremely conservative, but is necessitated by the FLM's requirement that we analyze worst case daily emissions for each hour and day of the year. In fact, operation of the plant in this manner is not provided for in our air permit application, would result in exceedances of emission limits expected to be included in the facility's PSD permit, and is not physically possible.[3]

In addition to the 365 daily cold starts, the use of worst case daily emission rates in these analyses reflects concurrent operation of the auxiliary boiler and standby generator. Although this equipment may operate, at times, in parallel with turbine operation, they will be limited by the PSD permit to operations much less frequent than those analyzed in the regional haze analyses.

In short, the emissions estimates dictated by the FLMs for this analysis are extremely conservative, and lead to large overestimates of potential regional haze impacts. Additional elements of conservatism included in the analysis include the following:

- The analyses assume that long-range transport conditions can be represented by a single meteorological station. Since only one station is used, the long-range transport of pollutants assumes that certain parameters, such as wind speed, wind direction, and stability will not vary over the entire modeling domain on an hour by hour basis.

- The use of the simplified MESOPUFF II chemical transformation scheme also results in overly conservative predictions by the model. CALPUFF is capable of simulating the chemical transformation of pollutants which contribute to regional haze and atmospheric deposition such as the transformation of sulfur dioxide to ammonium sulfate – a fine particle which effectively scatters light, thereby increasing haze. CALPUFF in screening mode requires the user to provide single

---

[2] "Mitigation measures recommended by FLMs may include stringent control technologies to minimize the increase in emissions and the impact on AQRVs. Monitoring can determine whether predicted resource conditions are observed. Offsets ensure that net emissions reductions from all sources will occur within a geographic area and their resulting air quality impacts at the Class I area will be mitigated." (Federal Land Managers Air Quality Related Values Workgroup (FLAG). Phase 1 Report. December 2000. p. 17)

[3] By definition, a cold startup is preceded by 72 hours of non-operation. Thus, at most, a cold start could be performed once every four days, or 91 days per year.

background concentrations of ozone and ammonia, which participate in the chemical reactions in order to accurately quantify the impacts. For ozone (O3), an average concentration of 64.7 ppb, collected at Joshua Tree National Park, was used for all Class I areas. For ammonia (NH_3), a domain average value of 10.0 ppb was used, which better represents grassland regions rather than the 1-3 ppb range typically applicable to arid regions. The elevated background concentrations of ammonia and ozone were used as requested by the FLMs in the CALPUFF screening analysis and result in an over prediction of Class I AQRVs.

- The selection of receptors provides a third conservative assumption. Three receptor rings were created for each of these three Class I areas, one ring each representing the nearest, middle, and farthest distances from the project site to a location within the Class I area, with no receptor ring closer than 50 kilometers to the project site. Each receptor ring consists of 1 degree equally-spaced receptors at an elevation equal to the mean elevation of the transecting arc in the Class I area. To assess impacts to each Class I area, the receptor with the highest concentration, deposition rate, or change in visibility is used, regardless of the location of the receptor. In other words, the maximum impacted receptor could be located far from the Class I area, and in a location with fundamentally different winds than those that might transport pollutants from the source to the Class I area, yet that receptor is used to represent impacts at the Class I area.

- The use of sulfate emissions and the effects of elemental carbon and organic carbon (derived from PM_{10} emissions) on the calculation of light extinction provides yet another level of conservatism in the model predictions. Conservative CALPOST options include the formation of hygroscopic species based on maximum seasonal relative humidity [f(rh)] values and background concentrations of hygroscopic and non-hygroscopic species. Maximum hourly relative humidity was limited to 98%, as requested by the FLMs. Wet deposition rates were not monitored at any of the Class I Areas. Therefore, in keeping with the conservative nature of the analysis, the background nitrogen wet deposition flux was conservatively assumed to be equal to the background dry deposition flux.
  This is likely to result in an overstatement of impacts in the relatively dry areas that are the subject of these analyses.

Each of these elements results in the conservative overstatement of impacts in the Class I areas beyond levels that are likely to be experienced. It is this degree of conservatism, combined with the mitigation provided through the use of LAER technology and the surrender of emission reduction credits, which supports the provision of additional monitoring resources to the FLMs to ensure that AQRVs are protected in the affected Class I areas.

If you have any questions or need any additional information, please do not hesitate to call me at (916) 444-6666.

Sincerely,

Gary Rubenstein
Sierra Research

Enclosure (modeling CD)

cc w/enclosure:
Trent Procter, U.S. Forest Service
John Notar, National Park Service
Li Chen, SCAQMD
John Yee, SCAQMD
Mike Hatfield, Calpine
Jenifer Morris, Calpine
Jim McLucas, Calpine
Mark Smolley, Calpine
Barbara McBride, Calpine
Connie Bruins, CEC
CEC Dockets Office, Docket #01-AFC-17

Attachment A

Responses to April 25, 2005 FLM Comments

Response to Questions/Comments on Inland Empire Class I Modeling Analysis

Comment 1: Table 5.2-21 (Revised 1/24/05) from the "Inland Empire Proposed Permit Changes" document submitted to South Coast Air Quality Management District (SCAQMD) on February 2, 2005 has been used to assess the emissions input to the CALPUFF model. My conclusion is that CALPUFF modeling used the annual average emissions listed in Table 5.2-21. Use of the annual average emissions is generally acceptable only for modeling those pollutants where the averaging time of the impact is one-year or greater (for example NOx increment or sulfur/nitrogen deposition). For visibility, the averaging time of interest is 24-hours since the 24-hour average pollutant concentrations are used to calculate the daily change in light extinction. As such, the estimates of visibility reduction should be based on modeling the "maximum daily emissions" listed in Table 5.2-21 and should not use the "maximum annual emissions". The "maximum daily emissions" should also be used to model the 24-hour average increment consumption for SO_2 and PM-10. For the 3-hour average SO_2 increment consumption, the modeling should be based on the "maximum hourly emissions". If my analysis of the emissions modeled in CALPUFF is correct, then the impacts to visibility as well as the 3-hour and 24-hour increment consumption have likely been underreported by the applicant in the permit application.

Response 1: This issue was not raised in the April 1, 2005 informal FLM comments on the March 4, 2005 IEEC Class I impact analysis. The annual average facility-wide emission levels were used for the regional haze and Class I increment modeling because these emissions more accurately characterize the expected emissions for this project during normal operation. The maximum daily emissions included in the February 2, 2005 permit application to the SCAQMD represents an extreme operating case with both gas turbines undergoing simultaneous 6-hour cold startups followed by 18 hours of cold ambient temperature baseload operation. This extreme case also assumes the auxiliary boiler is operating at maximum load for 24 hours and assumes that one of the standby generator engines is operating at full load for 6 hours. While this extreme operating case is unlikely to occur, as requested in this comment, a revised regional haze analysis was performed using the maximum facility-wide daily emission levels shown in the February 2, 2005 SCAQMD permit application package. In addition, a revised Class I increments analysis was performed with the facility-wide emissions adjusted to match the Class I increments averaging periods. For example, maximum daily facility-wide emissions were used to analyze the impacts on the 24-hr SO_2 and PM_{10} Class I increments. Since the extreme daily operating case will occur very infrequently, we also included a revised regional haze analysis examining the impacts associated with only the operation of the gas turbines. Furthermore, as requested below in Comment 3, the revised regional haze and Class I increments analyses include the full ring of receptors rather than the receptors only within each Class I area. As shown in Attachment A-1, Table 1-1, the use of maximum daily emissions and the full ring of receptors increases both the maximum percent change in light extinction and the number of days over the three-year period with impacts greater than the light extinction significance level of 5%. However, when only the maximum daily emissions from the gas turbines are examined, (reflecting a more typical, but still worst-case, condition) there is a substantial decrease in the number of days above the significance level. As shown in Attachment A-1, Table 1-2, while the use of the entire ring of receptors and matching the facility-wide emission rate to the Class I increment averaging period increases modeled impacts, the maximum impacts remain well below the Class I increment levels. The revised regional haze and Class I increment modeling files are included in the enclosed compact disk.

Comment 2: In VISCREEN, the modeled emissions appear to be consistent with the "maximum daily emissions", but since the "plume" visibility impact that VISCREEN is attempting to simulate is a quasi-instantaneous phenomenon, the VISCREEN modeling is more appropriately conducted with the "maximum hourly emissions". However, as the "maximum hourly emissions" are indicative only of emissions during start-up, a separate modeling analysis of the "normal" operational emissions may be appropriate. This would allow the FLM to include an assessment of the "frequency" of start-up related impacts in the overall evaluation of the project. Another item with VISCREEN is that the modeling appears to include all emission sources, including the auxiliary boiler and standby generators. However, these emissions are released at a different height and would not combine with the turbine emissions to form a coherent "plume". As such, only the turbine emissions need to be included in the VISCREEN modeling.

Response 2: As requested in this comment, a revised set of VISCREEN modeling runs were performed based on maximum hourly emission levels for the two gas turbines. Maximum hourly emissions occur during the simultaneous startup of both gas turbines. To provide a comparative basis for the startup impacts, we also performed a revised set of VISCREEN modeling with both gas turbines operating at maximum baseload levels. The following NOx, sulfate, and PM_{10} emission levels were used for these revised analyses:

- NOx emissions of 408 lbs/hr per gas turbine (startups)
- NOx emissions of 18.83 lbs/hr per gas turbine (baseload)

- Total PM_{10} emissions of 10 lbs/hr per gas turbine (startups and baseload)
- Sulfate emissions of 1 lbs/hr per gas turbine (startups and baseload)

Per FLM guidance[4], the following adjustments were made to the gas turbine particulate emission rates:

Gas Turbine Condensable PM = [0.75 * total PM] – sulfate emissions

= [(0.75)*(10 lbs/hr*2*453.6 g/lb*hr/3600 sec)]- 0.252 g/sec
= <u>1.638 g/sec</u>

Gas Turbine Filterable PM = [0.25 * total PM]

= [(0.25)*(10 lbs/hr*2*453.6 g/lb*hr/3600 sec)] = <u>0.630 g/sec</u>

As shown in Attachment A-2, Table 2-1, during gas turbine startups the modeled impacts exceed the significance levels in all three nearby Class I areas. However, during maximum baseload gas turbine operation the impacts are below the significance levels in these Class I areas. Regarding the frequency of gas turbine startups, according to the annual dispatch projections developed by IEEC, during a normal year approximately 275 hours of startups are expected. According to the NOx RECLAIM Trading Credit cases analyzed for this project, for a normal year a maximum of 520 hours of startup per year per turbine are expected. Consequently, the frequency of startups per year ranges from approximately 3% (275/8760) to 6% (520/8760) of the total hours per year.

Comment 3: The CALPUFF modeling was set up following the CALPUFF-Lite screening guidelines with receptors located at the distance to the Class I area, and in all direction from the source. However, the CALPOST processing does not appear to calculate impacts at all modeled receptors. The CALPUFF screening modeling approach requires that impacts in all directions be analyzed and compared to the applicable limits. The applicant should provide the CALPUFF results for receptors in all directions as required by the screening procedure. If the applicant wishes to restrict the modeling to only those receptors within the Class I area boundaries, then a refined CALPUFF analysis should be performed.

Response 3: As discussed in our responses to the April 1, 2005 informal FLM comments on the March 4, 2005 IEEC Class I impact analysis, the revised 2005 analysis was performed following the guidance provided by

[4] According to FLM guidance (see http://www2.nature.nps.gov/air/Permits/flag/EdRevConsensusGasCTexample.xls)

the FLMs for the Class I modeling analysis that was performed for the IEEC project in December 2002. For the December 2002 analysis, the CALPUFF modeling restricted the modeling to only those receptors within the Class I area boundaries. As discussed in Response 1, we performed a set of revised Class I impact analyses that included the use of the entire receptor rings rather than only the receptors within the Class I areas, and the revised results for the regional haze and Class I increment analyses are shown in Attachment A-1. We also performed a revised nitrogen/sulfur deposition analysis using the entire ring of receptors and the results of this analysis are summarized in Attachment A-3, Table 3-1. As shown in this table, the use of the entire ring of receptors results in no change to conclusions regarding the significance of nitrogen/sulfur deposition impacts.

Comment 4: The CALPOST visibility modeling uses a particulate matter (PM) extinction coefficient of 5.69, which I assume is intended to account for those PM emissions which may be elemental carbon or secondary organic aerosol. Such an approach is proper, but I would like to see how the applicant derived the 5.69 extinction value for PM. We probably have improved the data on PM speciation from gas turbines since the 2002 Inland Empire analysis was conducted.

Response 4: As discussed in our responses to the April 1, 2005 informal FLM comments on the March 4, 2005 IEEC Class I impact analysis, the light extinction coefficient for PM of 5.69 used for the March 4, 2005 analysis was originally derived for the December 2002 IEEC Class I impact analysis. It is calculated based on the 2002 FLM guidance for natural gas-fired gas turbines (see Footnote 1) that 25% of the total particulate emissions is filterable (elemental carbon) and the remaining 75% of the total particulate is condensable (organic carbon). If sulfate emissions are included separately in the CALPUFF modeling analysis, the FLM guidance also allows for the removal of sulfate emissions during the calculation of the organic carbon emissions. We are not aware of newer FLM guidance regarding PM speciation for natural gas-fired gas turbines. The following detailed calculations show how the light extinction coefficient for PM was calculated for the December 2002 IEEC analysis:

Total PM_{10} emissions for gas turbines = 17.857 lbs/hr (two gas turbines)
SO_4 emissions for gas turbines = 2.00 lbs/hr (two gas turbines)

Filterable PM (elemental carbon) = (0.25)(17.857 lbs/hr) = 4.464 lbs/hr
Condensable PM (organic carbon) = (0.75)(17.857 lbs/hr)-2.00 lbs/hr = 11.393 lbs/hr
Extinction coefficient for elemental carbon = 10
Extinction coefficient for organic carbon = 4

Extinction Coefficient for PM =
[(4.464*10)+(11.393*4)]/(4.464+11.393) = <u>5.69</u>

The approach used for the December 2002 IEEC Class I analysis was used for the March 2005 analysis. However, upon closer examination of this calculation, for the March 2005 analysis, the extinction coefficient for PM should be updated to account for the change in PM_{10} emissions for the gas turbines. The following calculations show the revised particulate extinction coefficient.

Total PM_{10} emissions for gas turbines = 20.00 lbs/hr (two gas turbines)
SO_4 emissions for gas turbines = 2.00 lbs/hr (two gas turbines)
Filterable (elemental carbon) = (0.25)(20.00 lbs/hr) = 5.00 lbs/hr
Condensable (organic carbon) = (0.75)(20.00 lbs/hr)-2.00 lbs/hr = 13.00 lbs/hr
Extinction coefficient for elemental carbon = 10
Extinction coefficient for organic carbon = 4
Extinction Coefficient for PM =
[(5.00*10)+(13.00*4)]/(5.00+13.00) = <u>5.67</u>

This PM extinction coefficient was used for all the revised Class I impact modeling performed as part of this response package.

Comment 5: The San Jacinto and San Gorgonio Class I areas straddle the 50 km distance at which the CALPUFF model is normally applied. Because portions of these areas are beyond 50 km from the source, a CALPUFF visibility analysis to these areas is also appropriate. The applicant should provide a CALPUFF visibility analysis for San Jacinto and San Gorgonio as well, instead of relying only on the VISCREEN modeling. This should not be a significant burden to the applicant as the CALPUFF modeling for these areas has already been done for the deposition calculations.

Response 5: As discussed in our responses to the April 1, 2005 informal FLM comments on the March 4, 2005 IEEC Class I impact analysis, as with the December 2002 Class I analysis performed for the IEEC project, the March 2005 Class I analysis performed VISCREEN rather than CALPUFF modeling for the San Jacinto and San Gorgonio Wilderness Areas because these areas are within 50 km of the project site. The FLMs did not object to this approach for the December 2002 analysis, and we applied the same methodology for the current analysis. In addition, neither the Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report (December 1998) nor the Federal Land Managers' Air Quality Related Values Workgroup (FLAG) Phase I Report (December 2000) require both a coherent plume (VISCREEN) analysis and a regional haze/acid deposition analysis (CALFUFF) for

Class I areas that straddle the 50 km distance from a project site. However, as requested in this FLM comment, we performed a revised regional haze analysis for these two nearby Class I areas and the results are discussed in Response 1.

Comment 6: As the CALPUFF modeling for Inland Empire includes multiple emission sources, the POSTUTIL processing as performed by the applicant results in a conservative overestimate of the sulfate and nitrate formation. This is due to the model assumption that all available ammonia reacts individually with each puff to form sulfate and nitrate. Where puffs overlap, only a fraction of the available ammonia will actually be available to participate in the sulfate and nitrate formation reactions. A more realistic assessment of sulfate and nitrate formation can be applied by using the MNITRATE = 1 switch within POSTUTIL. This would lower the resulting visibility impact and would offset at least somewhat, the use of more representative, but higher, project emission rates.

Response 6: We examined the use of the MNITRATE switch and confirmed that this post processing option cannot be used when CALPUFF is in the screening mode as is the case for this analysis.

Comment 7: Despite the issues with the CALPUFF-Lite modeling raised above, the modeling predicts impacts exceeding the 5% regional haze threshold at Joshua Tree (4 days over a 3 year period) and impacts exceeding the 0.005 kg/ha/yr DAT for nitrogen deposition at several Class I areas. Based on the impacts at Joshua Tree, it is likely that regional haze impacts at San Jacinto and San Gorgonio are even higher (these were not modeled by the applicant). My opinion is that once the applicant corrects the CALPOST modeling to include receptors in all directions as required under the screening procedure and make the other requested changes, the predicted impacts may be higher than reported. The applicant has also provided a qualitative discussion related to the deposition modeling arguing that the Daggett meteorological data used for the screening modeling does not properly describe plume transport at the project site. While the Daggett data may not be fully representative of plume transport from the project site, the appropriate option for the applicant to refute screening model results would be to provide a refined CALPUFF modeling study. Unless a refined modeling study is provided, my opinion is that the FLM must base any judgments about the project on the screening modeling results. The screening modeling results should not be dismissed results based solely on qualitative arguments, particularly when a valid quantitative modeling option exists, such as refined CALPUFF modeling.

Response 7: Please see the discussion in the cover letter to this package regarding the significance of modeled impacts and mitigation measures proposed for the project.

ATTACHMENT A-1

SUMMARY OF REVISED REGIONAL HAZE AND
CLASS I INCREMENTS ANALYSES

Table 1-1
Summary of Regional Haze Analyses
IEEC Project

	Original Runs		Revised Runs		Revised Runs		Revised Runs		Revised Runs	
Emission Rate Basis	Annual – Facility Wide		Annual – Facility Wide		Daily – Facility Wide		Daily – Facility Wide		Daily – Gas Turbines Only	
Receptors	w/in Class I Area		Entire ring		w/in Class I Area		Entire Ring		Entire Ring	
	Maximum Change	Days Over 5%	Maximum Change	Days Over 5%	Maximum Change	Days Over 5%	Maximum Change	Days Over 5%	Maximum Change	Days Over 5%
Cucamonga Wilderness Area	3.95%	0	7.16%	12	5.27%	2	9.50%	55	8.58%	26
Joshua Tree National Park	6.41%	4	6.41%	4	8.69%	27	8.84%	35	8.00%	16
San Gabriel Wilderness Area	2.84%	0	4.70%	0	4.14%	0	6.87%	20	6.53%	5
San Jacinto Wilderness Area	na	na	11.81%	103	na	na	11.82%	115	10.72%	56
San Gorgonio Wilderness Area	na	na	6.75%	11	na	na	11.82%	115	10.72%	56

Note: “Days over 5%” indicate the total number of days during the three-year analysis period.

Table 1-2
Summary of Class I Increments Analyses
IEEC Project

	Original Runs		Revised Runs	
Emission Rate Basis	Annual – Facility Wide		Matches Increment* – Facility Wide	
Receptors	w/in Class I Area		Entire ring	
	Maximum Impact (μg/m3)	Class I Increment (μg/m3)	Maximum Impact (μg/m3)	Class I Increment (μg/m3)
Agua Tibia Wilderness Area	NO_2 (annual): 0.05 SO_2 (3-hr): 0.2 SO_2 (24-hr): 0.03 SO_2 (annual): 0.004 PM_{10} (24-hr): 0.2 PM_{10} (annual): 0.03	2.5 25 5 2 8 4	NO_2 (annual): 0.06 SO_2 (3-hr): 0.2 SO_2 (24-hr): 0.03 SO_2 (annual): 0.004 PM_{10} (24-hr): 0.2 PM_{10} (annual): 0.04	2.5 25 5 2 8 4
Cucamonga Wilderness Area	NO_2 (annual): 0.001 SO_2 (3-hr): 0.050 SO_2 (24-hr): 0.008 SO_2 (annual): 0.000 PM_{10} (24-hr): 0.07 PM_{10} (annual): 0.001	2.5 25 5 2 8 4	NO_2 (annual): 0.03 SO_2 (3-hr): 0.06 SO_2 (24-hr): 0.02 SO_2 (annual): 0.002 PM_{10} (24-hr): 0.1 PM_{10} (annual): 0.02	2.5 25 5 2 8 4
Joshua Tree National Park	NO_2 (annual): 0.02 SO_2 (3-hr): 0.04 SO_2 (24-hr): 0.01 SO_2 (annual): 0.002 PM_{10} (24-hr): 0.1 PM_{10} (annual): 0.02	2.5 25 5 2 8 4	NO_2 (annual): 0.02 SO_2 (3-hr): 0.05 SO_2 (24-hr): 0.01 SO_2 (annual): 0.003 PM_{10} (24-hr): 0.1 PM_{10} (annual):	2.5 25 5 2 8 4

	Original Runs		Revised Runs	
Emission Rate Basis	Annual – Facility Wide		Matches Increment* – Facility Wide	
Receptors	w/in Class I Area		Entire ring	
	Maximum Impact (µg/m3)	Class I Increment (µg/m3)	Maximum Impact (µg/m3)	Class I Increment (µg/m3)
			0.02	
San Gabriel Wilderness Area	NO_2 (annual): 0.001 SO_2 (3-hr): 0.02 SO_2 (24-hr): 0.000 SO_2 (annual): 0.000 PM_{10} (24-hr): 0.05 PM_{10} (annual): 0.001	2.5 25 5 2 8 4	NO_2 (annual): 0.02 SO_2 (3-hr): 0.04 SO_2 (24-hr): 0.008 SO_2 (annual): 0.001 PM_{10} (24-hr): 0.07 PM_{10} (annual): 0.01	2.5 25 5 2 8 4
San Gorgonio Wilderness Area	NO_2 (annual): 0.04 SO_2 (3-hr): 0.07 SO_2 (24-hr): 0.02 SO_2 (annual): 0.003 PM_{10} (24-hr): 0.2 PM_{10} (annual): 0.03	2.5 25 5 2 8 4	NO_2 (annual): 0.04 SO_2 (3-hr): 0.08 SO_2 (24-hr): 0.02 SO_2 (annual): 0.003 PM_{10} (24-hr): 0.2 PM_{10} (annual): 0.03	2.5 25 5 2 8 4
San Jacinto Wilderness Area	NO_2 (annual): 0.05 SO_2 (3-hr): 0.09 SO_2 (24-hr): 0.02 SO_2 (annual): 0.003 PM_{10} (24-hr): 0.2 PM_{10} (annual): 0.03	2.5 25 5 2 8 4	NO_2 (annual): 0.05 SO_2 (3-hr): 0.1 SO_2 (24-hr): 0.03 SO_2 (annual): 0.003 PM_{10} (24-hr): 0.2 PM_{10} (annual): 0.03	2.5 25 5 2 8 4

Note (Table 1-2):

* The averaging period for the emission rate is the same as the averaging period for the Class I increment. For example, 24-hr average emission rates were used to model the maximum 24-hr average ambient impacts.

ATTACHMENT A-2

SUMMARY OF REVISED VISCREEN MODELING

Table 2-1
Summary of VISCREEN Analyses (Significance Levels Delta E of 2.00 and Contrast of ±0.05)
IEEC Project

	Original Analysis		Revised 2005 Analysis – Startup		Revised 2005 Analysis – Normal	
Emission Rate Basis	Facility Wide – Maximum Daily[1]		Gas Turbines Only – Startup[2]		Gas Turbines Only – Normal Operation[3]	
	Delta E	Contrast	Delta E	Contrast	Delta E	Contrast
Agua Tibia Wilderness Area	1.717	-0.032	7.000	-0.067	1.473	-0.027
San Jacinto Wilderness Area	1.289	-0.024	5.353	-0.051	1.111	-0.020
San Gorgonio Wilderness Area	1.205	-0.021	4.831	-0.044	1.042	-0.018

Notes (Table 2-1):

1. Based on maximum daily facility-wide emissions (facility-wide NOx emissions of 107 lbs/hr, which includes both gas turbines undergoing a 6-hour cold startup at a NOx emission rate of 803 lbs/startup followed by 18 hours of baseload operation at a NOx emission rate of 18.83 lbs/hr).
2. Based on maximum hourly gas turbine only emissions during startups (both gas turbines undergoing simultaneous startups at a combined NOx emission rate of 816 lbs/hr with each gas turbine at a NOx emission rate of 408 lbs/hr).
3. Based on maximum hourly gas turbine only emissions during baseload operation (both gas turbines simultaneously operating at cold ambient baseload at a combined NOx emission rate of 37.66 lbs/hr with each gas turbine at a NOx emission rate of 18.83 lbs/hr).

REVISED VISCREEN MODELING OUTPUT FILES

Visual Effects Screening Analysis for
Source: IEEC Project - Baseline
Class I Area: San Gorgonio

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	1.64 G /S
NOx (as NO2)	4.74 G /S
Primary NO2	0.00 G /S
Soot	0.63 G /S
Primary SO4	0.25 G /S

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	1.5	1
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	0.06 ppm
Background Visual Range:	248.00 km
Source-Observer Distance:	46.00 km
Min. Source-Class I Distance:	46.00 km
Max. Source-Class I Distance:	54.00 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	5
Wind Speed:	1.50 m/s

RESULTS

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	123.	54.0	45.	2.00	0.627	0.05	-0.008
SKY	140.	123.	54.0	45.	2.00	0.581	0.05	-0.018
TERRAIN	10.	84.	46.0	84.	2.00	1.042	0.05	0.009
TERRAIN	140.	84.	46.0	84.	2.00	0.257	0.05	0.003

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	169.	2.00	8.692*	0.05	-0.096*
SKY	140.	0.	1.0	169.	2.00	7.428*	0.05	-0.206*
TERRAIN	10.	0.	1.0	169.	2.00	16.544*	0.05	0.207*
TERRAIN	140.	0.	1.0	169.	2.00	7.812*	0.05	0.168*

Visual Effects Screening Analysis for
Source: IEEC Project - Startups
Class I Area: San Gorgonio

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	1.64 G /S
NOx (as NO2)	102.82 G /S
Primary NO2	0.00 G /S
Soot	0.63 G /S
Primary SO4	0.25 G /S

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	1.5	1
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	0.06 ppm
Background Visual Range:	248.00 km
Source-Observer Distance:	46.00 km
Min. Source-Class I Distance:	46.00 km
Max. Source-Class I Distance:	54.00 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	5
Wind Speed:	1.50 m/s

RESULTS

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	123.	54.0	45.	2.00	4.831*	0.05	-0.035
SKY	140.	123.	54.0	45.	2.00	4.124*	0.05	-0.044
TERRAIN	10.	84.	46.0	84.	2.00	2.049*	0.05	0.012
TERRAIN	140.	84.	46.0	84.	2.00	1.227	0.05	0.006

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	169.	2.00	8.180*	0.05	-0.123*
SKY	140.	0.	1.0	169.	2.00	7.838*	0.05	-0.228*
TERRAIN	10.	0.	1.0	169.	2.00	16.848*	0.05	0.222*
TERRAIN	140.	0.	1.0	169.	2.00	8.163*	0.05	0.186*

Visual Effects Screening Analysis for
Source: IEEC Project - Baseline
Class I Area: San Jacinto

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	1.64	G /S
NOx (as NO2)	4.74	G /S
Primary NO2	0.00	G /S
Soot	0.63	G /S
Primary SO4	0.25	G /S

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	1.5	1
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	0.06 ppm
Background Visual Range:	246.00 km
Source-Observer Distance:	43.00 km
Min. Source-Class I Distance:	43.00 km
Max. Source-Class I Distance:	53.00 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	5
Wind Speed:	1.50 m/s

RESULTS

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	131.	53.0	38.	2.00	0.723	0.05	-0.010
SKY	140.	131.	53.0	38.	2.00	0.655	0.05	-0.020
TERRAIN	10.	84.	43.0	84.	2.00	1.111	0.05	0.009
TERRAIN	140.	84.	43.0	84.	2.00	0.269	0.05	0.003

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	168.	2.00	9.109*	0.05	-0.102*
SKY	140.	0.	1.0	168.	2.00	7.582*	0.05	-0.214*
TERRAIN	10.	0.	1.0	168.	2.00	17.148*	0.05	0.213*
TERRAIN	140.	0.	1.0	168.	2.00	7.970*	0.05	0.171*

Visual Effects Screening Analysis for
Source: IEEC Project - Startups
Class I Area: San Jacinto

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	1.64 G /S
NOx (as NO2)	102.82 G /S
Primary NO2	0.00 G /S
Soot	0.63 G /S
Primary SO4	0.25 G /S

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	1.5	1
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	0.06 ppm
Background Visual Range:	246.00 km
Source-Observer Distance:	43.00 km
Min. Source-Class I Distance:	43.00 km
Max. Source-Class I Distance:	53.00 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	5
Wind Speed:	1.50 m/s

RESULTS

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	131.	53.0	38.	2.00	5.353*	0.05	-0.040
SKY	140.	131.	53.0	38.	2.00	4.545*	0.05	-0.051*
TERRAIN	10.	84.	43.0	84.	2.00	2.178*	0.05	0.012
TERRAIN	140.	84.	43.0	84.	2.00	1.278	0.05	0.006

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	168.	2.00	8.496*	0.05	-0.130*
SKY	140.	0.	1.0	168.	2.00	8.025*	0.05	-0.238*
TERRAIN	10.	0.	1.0	168.	2.00	17.446*	0.05	0.229*
TERRAIN	140.	0.	1.0	168.	2.00	8.346*	0.05	0.190*

Visual Effects Screening Analysis for
Source: IEEC Project - Baseload
Class I Area: Agua Tibia

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	1.64 G /S
NOx (as NO2)	4.74 G /S
Primary NO2	0.00 G /S
Soot	0.63 G /S
Primary SO4	0.25 G /S

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	1.5	1
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	0.06 ppm
Background Visual Range:	246.00 km
Source-Observer Distance:	33.50 km
Min. Source-Class I Distance:	33.50 km
Max. Source-Class I Distance:	44.75 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	5
Wind Speed:	1.50 m/s

RESULTS

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	140.	44.8	29.	2.00	0.970	0.05	-0.013
SKY	140.	140.	44.8	29.	2.00	0.880	0.05	-0.027
TERRAIN	10.	84.	33.5	84.	2.00	1.473	0.05	0.011
TERRAIN	140.	84.	33.5	84.	2.00	0.327	0.05	0.004

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	168.	2.00	10.339*	0.05	-0.118*
SKY	140.	0.	1.0	168.	2.00	8.381*	0.05	-0.248*
TERRAIN	10.	0.	1.0	168.	2.00	19.727*	0.05	0.240*
TERRAIN	140.	0.	1.0	168.	2.00	8.738*	0.05	0.180*

Visual Effects Screening Analysis for
Source: IEEC Project - Startups
Class I Area: Agua Tibia

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	1.64 G /S
NOx (as NO2)	102.82 G /S
Primary NO2	0.00 G /S
Soot	0.63 G /S
Primary SO4	0.25 G /S

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	1.5	1
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	0.06 ppm
Background Visual Range:	246.00 km
Source-Observer Distance:	33.50 km
Min. Source-Class I Distance:	33.50 km
Max. Source-Class I Distance:	44.75 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	5
Wind Speed:	1.50 m/s

RESULTS

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	140.	44.8	29.	2.00	7.000*	0.05	-0.054*
SKY	140.	140.	44.8	29.	2.00	5.963*	0.05	-0.067*
TERRAIN	10.	84.	33.5	84.	2.00	2.715*	0.05	0.013
TERRAIN	140.	84.	33.5	84.	2.00	1.473	0.05	0.006

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	5.	10.4	164.	2.00	10.804*	0.05	-0.129*
SKY	140.	5.	10.4	164.	2.00	9.313*	0.05	-0.162*
TERRAIN	10.	0.	1.0	168.	2.00	20.026*	0.05	0.257*
TERRAIN	140.	0.	1.0	168.	2.00	9.318*	0.05	0.200*

ATTACHMENT A-3

SUMMARY OF REVISED NITROGEN/SULFUR DEPOSITION IMPACTS

Table 3-1
Summary of Nitrogen/Sulfur Deposition Analyses (Significance Level is 0.005 kg/ha-yr)
IEEC Project

	Original Analysis		Revised Analysis		Revised Analysis	
Emission Rate Basis	Annual – Facility Wide		Annual – Facility Wide		Annual – Gas Turbines Only	
Receptors	w/in Class I Area		Entire Ring		Entire Ring	
	Total Nitrogen (kg/ha-yr)	Total Sulfur (kg/ha-yr)	Total Nitrogen (kg/ha-yr)	Total Sulfur (kg/ha-yr)	Total Nitrogen (kg/ha-yr)	Total Sulfur (kg/ha-yr)
Agua Tibia Wilderness Area	0.010	0.001	0.012	0.001	0.011	0.001
Cucamonga Wilderness Area	0.000	0.000	0.005	0.001	0.005	0.001
Joshua Tree National Park	0.0046	0.001	0.0046	0.001	0.0045	0.001
San Gabriel Wilderness Area	0.000	0.000	0.003	0.000	0.003	0.000
San Jacinto Wilderness Area	0.009	0.001	0.009	0.001	0.009	0.001
San Gorgonio Wilderness Area	0.008	0.001	0.008	0.001	0.008	0.001